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TRANSLATION

from

ROTHA FULLFORD LEOPOLD

BCM BOX 6575
LONDON WC1N 3XX
ENGLAND

P.O. BOX 7
WODEN, A.C.T.
AUSTRALIA 2606

JAPANESE PATENT SPECIFICATION

No. 51-113813 (1976)

GRANULATION OF MALTITOL

Filing date: March 3, 1975, No. 50-25045 (Examination not requested)

Specification published: unexamined: October 7, 1976

Inventor(s): T. Hiraiwa

Assignee: T. Hiraiwa

PATENT CLAIM

A process for granulation of maltitol, comprising the steps of melting at about 125° to 200° substantially anhydrous maltitol obtained by concentration of maltitol syrup, spraying said molten maltitol into an atmosphere at a temperature of at least 50°, and cooling to a temperature below about 38°.

EXAMPLE 1

A 75% maltitol syrup containing, on a solids basis, ~~9.45%~~ 94.5% maltitol and 5.5% tri- and higher saccharides was concentrated in a descending thin film evaporator at a maximum temperature of 135°. The

Please Note—Names of Japanese firms, research laboratories and government entities, as translated, are not necessarily identical with the names adopted by such organizations for international contacts. Japanese personal and surnames often permit of several readings and the ones used in this translation are not necessarily the ones preferred by their bearers. Foreign names mentioned in Japanese specifications cannot always be accurately reconstructed.

substantially anhydrous concentrate so obtained was allowed to descend by gravity through a plate with 1 mm diameter orifices into a granulation tower of 1.2 m diameter and 8 m height. The atmosphere in the top of the tower was maintained at 154° by means of infrared heaters. The cooling air in the bottom was at a temperature of 17° and relative humidity of 40% ~~42%~~. The product collected from the bottom had a substantially spherical particle shape and was substantially clear. These particles had a size distribution range of 2,000-2,500 microns and an angle of repose of 42°.

EXAMPLE 2

A maltitol concentrate was heated at 160°. At this temperature 0.2% by weight of saccharin was admixed, followed by downward extrusion at this temperature through a 0.7 mm bore orifice under 19 kg/cm^2 pressure into a granulation tower of 1.8 m diameter and 12 m height. The heating zone in the tower was maintained at 70° by a hot-air blast. The cooling zone was at a temperature of 15° and relative humidity of 50%. The granules collected at the bottom had a size distribution of about 250-780 microns. The particles had an angle of repose of 37°. The uncompacted bulk density of the material was 0.79. After compaction this was 0.83. The particles were substantially spherical and transparent.

EXAMPLE 3

Maltitol melted at 135° was sprayed into the tower of Example 1 through the 1.5 mm orifice of a twin-fluid jet by hot air at 150° under pressure of 6 kg/cm^2. The heating zone was at a temperature of 150° and the cooling zone of 15°/50% R.H.

The product size distribution range was about 150-1,350 microns, the angle of repose was 38° and the uncompacted and compacted bulk densities were 0.82 and 0.87, respectively.

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FULL DISCLOSURE OF THE INVENTION

This invention relates to a process for granulation of maltitol which has been made substantially anhydrous by concentration (from the syrup state). Maltitol is derived from maltose by hydrogenation and is a sweetener of extremely low calorific value but rivals cane sugar in sweetness quality and has 85-95% of the sweetening power of cane sugar. Unlike saccharin and some other synthetic sweeteners it is free from unpleasant after taste. It has therefore attracted attention as a sweetener for low calorie and diabetic diets and as an ingredient of health foods.

Unlike cane sugar, maltitol is not crystallizable. When boiled down to at least 98% solids maltitol syrup solidifies to a glasslike mass which is strongly hygroscopic and becomes deliquescent on standing through absorption of moisture from the atmosphere. When the glassy mass is crushed or ground, the particles become tacky and coalesce into a lump. Crushing or grinding with exposure to atmospheric humidity is therefore not practical. When 98+% maltitol is for example crushed in a hammer mill under conditions of 38° and 40% R.H., the product has a wide particle size distribution and an angle of repose of about 34°, hence has good free-flowing properties. However, the wide particle size distribution and the irregular particle shapes make screening of the crushed product difficult and weaken its mechanical strength (?). During transport and storage the product has a tendency to form fines. Such a product is not only inconvenient to handle and use but the dust (fines) contained in it causes equipment fouling, environmental pollution and product loss. It also renders automatic bagging or packaging difficult.

As a result of assiduous researches into methods of defeating the above shortcomings, this inventor made a discovery on which the present invention is based, viz. that excellent spherical beads or granules are produced

by spraying of molten maltitol into a heated atmosphere, followed by cooling.

In accordance with the invention, the syrup concentrate is melted and dispersed into a heated atmosphere by means of a nozzle type or the like atomizer. (A spray cooling process for production of granules or beads is already known per se).

When a maltitol syrup has been dehydrated to 98% solids or more, considerations of viscosity and thermal stability limit the temperature range for spraying of the concentrate to between about 125° and about 200°. Similarly, spraying into an atmosphere at a temperature of less than 45° invites joining of the sprayed droplets into chains. Even if the molten droplets retain their individuality, they taper off into a tail and thus lose their spherical shape. In general the spraying operation tends to be unstable and the yield of satisfactory granules or beads is low. It is thought that these phenomena are mainly due to the specific physical properties of maltitol, especially its temperature-viscosity characteristics.

As the spraying result is impossible to control by variations in melt and spray temperature, this invention specifies spraying into an atmosphere at a temperature of 50° or higher, especially about 90° to about 200°, as a means of producing perfect droplets.

The molten maltitol is injected at a temperature of between 125° and a maximum of 350°. At an injection temperature of 200° the maximum permissible temperature is 300° (?).

Therefore, what this invention puts forward is a process for granulation of maltitol which comprises the steps of melting, at about 125° to 200°, substantially anhydrous maltitol obtained by concentration of maltitol syrup, introducing the molten maltitol into a spray apparatus, spraying the molten maltitol into a granulation column or the like space into which simultaneously a hot air blast is introduced to maintain said space at a temperature of 50° or higher, or heating said space at said temperature by infrared heating or the like heating means. If the sprayed maltitol is at a high temperature, the temperature in the granulation column may be kept comparatively low, but it should be kept comparatively high if the sprayed maltitol is at a comparatively low temperature. When the sprayed particles are fully dispersed, they are introduced into a cooling zone maintained at a temperature of about 38° or less. Solid spherical particles are recovered from this zone.

The invention also encompasses the following modifications:

1. The term "maltitol" as used above relates not only to pure maltitol but should be understood to include maltitol containing a small amount of sorbitol and the like as is the case with products of commerce such as "Malbit" (spelling uncertain). It may contain saccharin or the like synthetic sweetener. Also, a small amount of aroma or flavoring is unobjectionable.

2. The term "spray apparatus" should be understood to include pressure nozzles, fluid nozzles, ultrasonic nozzles, rotary disk type atomizers and plate nozzles. The plate nozzles may be of the gravity type or the pressure-assisted dropping type.

[Examples 1-3 separately translated.]

EXAMPLE 4

A plate nozzle with 1.8 mm diameter holes was used. The heated atmosphere was at a temperature of 50°. Other conditions and the equipment used were the same as in Example 1.

The particle size distribution was about 3,000 microns to about 3,500 microns. The spherical beads had an angle of repose of 45°.

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Partial translation of Japanese 51-113813 - Corrigenda

Page 1. Line 2 of Example 1 -

"9.45% maltitol" should read "94.5% maltitol"

Page 2. Line 7 -

Relative humidity should be 40% not 42%

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WPI Acc No: 84-209028/198434

Granulating maltitol - by passing conc. dewatered soln. through perforation into heated atmos., and cooling

Patent Assignee: TOWA KASEI KOGYO KK (TOAG)

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
JP 51113813	A	19761007	JP 7525045	A	19750303		198434 B

Priority Applications (No Type Date): JP 7525045 A 19750303

Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
JP 51113813	A		3			

Abstract (Basic): JP 51113813 A

Method comprises melting conc. and dewatered maltitol at 125-200 deg.C, dividing the melt through a perforation into an atmos. heated at least 50 deg.C and cooling the powder to at least 38 deg.C to provide the powder.

ADVANTAGE - Method provides transparent spherical granules of maltitol free from surface micropowder which adversely affect subsequent treatments.

In an example, an aq. 75% maltitol soln. contg. solids comprising 94.5% maltitol and 5.5% of hydrogenated trisaccharides and higher ides was evapd. through a film evaporator at the max. temp. of 135 deg.C under normal pressure to provide substantially anhydrous maltitol which was dropped through plate nozzles having a pore dia. of 1 mm under gravity into a granulating column having a dia. of 1.2 mm and a height of 8 m and maintained at 154 deg.C by infra-red heating. It was then passed through a cooling air zone at 17 deg.C and RH of -40% to provide granules having size distribution of 2000-2500 microns.

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Derwent Class: D17